Contents

Publication schedule v

THIN FILMS FOR MICROELECTRONICS

VLSI devices: deposition, processing, and properties

Integration of chemical–mechanical polishing into CMOS integrated circuit manufacturing 1
H. Landis, P. Burke, W. Cote, W. Hill, C. Hoffman, C. Kaanta, C. Koburger, W. Lange, M. Leach and S. Luce (Essex Junction, VT, USA)

Stress and current induced voiding in passivated metal lines 8
P. Børgesen, M. A. Korhonen and C.-Y. Li (Ithaca, NY, USA)

Electromigration evaluation of aluminum alloys in multilevel metallization 14
J. H. Givens, L. A. Miller, B. W. Porth, R. A. Serafin, P. A. Burke and S. E. Luce (Essex Junction, VT, USA)

A method to estimate local deposition conditions using film profiles in features 19
M. B. Chaara and T. S. Cale (Tempe, AZ, USA)

Metals for interconnects

The effect of subtractive defects and grain size on VLSI interconnect early failure 24
S. S. Menon and K. F. Poole (Clemson, SC, USA)

Sensors

Integrated circuit microsensor for selectively detecting nitrogen dioxide and diisopropyl methylphosphonate 30
E. S. Kolesar, Jr., C. P. Brothers, Jr., C. P. Howe, T. J. Jenkins, A. T. Moosey, J. E. Shin and J. M. Wiseman (Dayton, OH, USA)

Deposition techniques

Low temperature plasma-assisted oxidation and thin-film deposition processes for forming device-quality SiO_2/Si and composite dielectric-SiO_2/Si heterostructures 38
G. Lucovsky, T. Yasuda, Y. Ma, S. Habermehl, S. S. He and D. J. Stephens (Raleigh, NC, USA)

PETEOS simulation using EVOLVE, a deposition simulator 45
T. E. Zirkle, C. I. Drowley, W. G. Cowden (Mesa, AZ, USA) and T. S. Cale (Tempe, AZ, USA)

Improved electrical properties of silicon dioxide films for MOS gate dielectrics grown in an inductively coupled r.f. plasma 50
A. J. Choksi, R. Lal and A. N. Chandorkar (Bombay, India)

SiO_2 deposition as a byproduct of SF_6 plasma in an electron cyclotron resonance reactor 55
A. J. Watts, W. J. Varhue (Burlington, VT, USA) and M. L. Gibson (Essex Junction, VT, USA)

The characterization of TEOS oxides used in the isolation module of high-speed bipolar and BiCMOS circuits 59
S. R. Wilson and H.-B. Liang (Mesa, AZ, USA)

Reaction mechanism discrimination using experimental film profiles in features 66
T. S. Cale, G. B. Raupp, M. B. Chaara (Tempe, AZ, USA) and F. A. Shemansky (Phoenix, AZ, USA)

Densification of plasma deposited silicon nitride films by hydrogen dilution 73
R. E. Rocheleau and Z. Zhang (Honolulu, HI, USA)

Effects of substrate bias on properties of silicon nitride films prepared by activated reactive evaporation 80
J. S. Yoon (Seoul, South Korea), C. V. Deshpandey and R. F. Bunshah (Los Angeles, CA, USA)

Effects of oxygen partial pressure on lead content of PLZT thin films produced by excimer laser deposition 87
G. A. Petersen, Jr., and J. R. McNeil (Albuquerque, NM, USA)

Characterization of pulsed laser deposited zinc oxide 92
N. J. Ianno, L. McConville, N. Shaikh, S. Pittal and P. G. Snyder (Lincoln, NE, USA)

Geometrical factors affecting the CO_2 laser chemical vapour deposition of silicon oxide films in parallel configuration 100
D. Fernández, P. González, J. Pou, E. García, B. León and M. Pérez-Amor (Vigo, Spain)

Thin films for microelectronics (Poster session)

Properties of polysilicon films annealed by a rapid thermal annealing process 106
Lj. Ristic, M. L. Kniffin, R. Gutteridge and H. G. Hughes (Phoenix, AR, USA)

Comparative study of crystallization processes in Sb_2Te_3 films using laser and thermal annealing techniques 111
G. B. Reddy, A. Dhar, L. K. Malhotra and E. K. Sharmila (New Delhi, India)

Removal and transfer of material in laser-assisted physical vapour deposition of ceramics 116
A. Voss, J. Funken, M. Alunovic, H. Sung and E. W. Kreutz (Aachen, Germany)

DIAMOND AND RELATED MATERIALS

Electronic and optical applications of diamond and related materials

Chemical vapor deposition of novel electronic materials from carbon disulfide 122
C. L. Spiro, W. F. Banholzer and D. S. McAtee (Schenectady, NY, USA)

Optical properties of amorphous carbon thin films prepared by plasma deposition in a graphite hollow cathode 125
J. M. Mendez, S. Muhl, G. Contreras-Puente and J. Aguilar-Hernandez (Mexico D. F., Mexico)

TRIBOLOGICAL COATINGS/SURFACE MODIFICATIONS

Mechanical properties on the atomic scale

Friction force microscopy of mixed Langmuir–Blodgett films 132
E. Meyer, R. Overney, R. Lüthi, D. Brodbeck, L. Howald, J. Frommer, H.-J. Güntherodt (Basel, Switzerland), O. Wolter (Wetzlar, Germany), M. Fujihara, H. Takano and Y. Gotoh (Yokohama, Japan)

SUPERCONDUCTING FILMS

High T_c superconducting films

Physics and diagnostics of laser ablation plume propagation for high-T_c superconductor film growth 138
D. B. Geohegan (Oak Ridge, TN, USA)

Processing and characterization of high temperature superconductor films formed by spin-on coating and rapid thermal annealing ... 146
J. L. Chow (New York, NY, USA), D. A. Pentlow (Bronx, NY, USA), Q. Y. Ma and E. S. Yang (New York, NY, USA)

In situ fabrication of high T_c Y–Ba–Cu–O thin films by resistive evaporation 151
J. Azoulay (Tel Aviv, Israel)

ADVANCES IN COATING AND THIN FILM CHARACTERIZATION

Microstructure and buried interfaces

Analytical electron microscopy of thin films and interfaces 154
R. H. Geiss (San Jose, CA, USA)

Investigation of some microstructural features related to corrosion initiation in titanium–aluminium nitride coated steel 160
H. Ronkainen, U. Ehrnstén, R. Zilliacus, J. Saarilahti, A. Mahiout and S.-P. Hannula (Espoo, Finland)

On eliminating deposition-induced amorphization of interfaces in refractory metal multilayer systems 166
A. F. Jankowski (Livermore, CA, USA)

Nucleation of the decagonal quasicrystalline phase in Al–Cu–Co–Si thin films 172
J. Reyes-Gasga and R. Hernández (Mexico D. F., Mexico)

Interface sharpness in low-order III–V superlattices 176
J. Pellegrino (Gaithersburg, MD, USA), S. B. Qadri (Washington, DC, USA), P. M. Amirtharaj, N. V. Nguyen and J. Comas (Gaithersburg, MD, USA)

Silicide formation and phase separation from Cu/Nb and Nb/Cu bilayers on silicon 184
N. Mattoso Filho, C. Achete and F. L. Freire, Jr. (Rio de Janeiro, Brazil)

Surface and thin film analysis methods

Auger electron spectroscopy depth profiling studies on stationary and rotated samples of a new model metal/semiconductor multilayer structure 191
A. Zalar (Ljubljana, Slovenia), S. Hofmann (Stuttgart, Germany), P. Panjan and V. Kraševec (Ljubljana, Slovenia)

Auger electron spectroscopy and secondary ion mass spectrometry depth profiling with sample rotation 197
E.-H. Cirlin (Malibu, CA, USA)

Characterization of the first stages of the formation of metallic sputtered deposits and electrodeposits by Auger electron spectroscopy 204
P. V. Brande and R. Winand (Brussels, Belgium)

Chemistry and structure of GaAs surfaces cleaned by sulfur annealing 212
H. Sugahara (Kanagawa, Japan), M. Oshima (Tokyo, Japan), H. Oigawa and Y. Nannichi (Ibaraki, Japan)

Spectroscopic studies of the chemical properties of thin metal films on poly(ether imide) 217
J. L. Davis, M. Williams, J. K. Arledge and T. Swirlbel (Ft. Lauderdale, FL, USA)

A lapping and polishing process to achieve high quality alumina surfaces for applications in device fabrication 222
J. Khan (Shrewsbury, MA, USA)

Nondestructive characterization techniques

Precision metrology for studying thin films and surfaces 227
J. M. Bennett (China Lake, CA, USA)

Evaluation of optical properties of decorative coatings by spectroscopic ellipsometry 234
U. Beck, G. Reiners, I. Urban and K. Witt (Berlin, Germany)

Ellipsometric study of metal–organic chemically vapor deposited III–V semiconductor structures 241
S. A. Alterovitz (Cleveland, OH, USA), P. A. Sekula-Moise (Bedford, MA, USA), R. M. Sieg, M. N. Drotos and N. A. Bogner (Cleveland, OH, USA)

Development of artificial neural networks for real time, *in situ* ellipsometry data reduction 247
F. K. Urban, III, D. C. Park and M. F. Tabet (Miami, FL, USA)

Spectroscopic measurements of stress relaxation during thermally induced crystallization of amorphous titania films 254
G. J. Exarhos and N. J. Hess (Richland, WA, USA)

Characterization of the growth of sol–gel derived Ba–Ti–O thin films by laser Raman spectroscopy 261
H. C. Lu and G. L. Schrader (Ames, IA, USA)

Mechanical properties and film adhesion

Mechanical testing of thin metallic films 265
A. J. Griffin, Jr., F. R. Brotzen and C. F. Dunn (Houston, TX, USA)

An experimental approach to the analysis of the adhesion properties of SiC coatings deposited on steel substrates 271
M. Ignat (Saint-Martin d'Hères, France), M. Ducarroir, M. Lelogeais (Perpignan, France) and J. Garden (Saint-Martin d'Hères, France)

Nanoindentation studies of thin film coated systems 277
A. J. Whitehead and T. F. Page (Newcastle, UK)

Using thin films to produce precision, figured X-ray optics 284
F. Yuan, Y. Shi, L. V. Knight, R. T. Perkins and D. D. Allred (Provo, UT, USA)

Elastic–plastic characterization of thin films with spherical indentation 289
T. J. Bell, J. S. Field and M. V. Swain (Lindfield, NSW, Australia)

Advances in coating and thin film characterization (Poster session)

Fluorinated polymer films from r.f. plasmas containing benzene and sulfur hexafluorine 295
S. F. Durrant, R. P. Mota and M. A. B. de Moraes (Sao Paulo, Brazil)

Variable angle spectroscopic ellipsometric characterization of surface damage in chemical–mechanical polished GaAs 303
Y.-M. Xiong and P. G. Snyder (Lincoln, NE, USA)

OPTICAL FILMS AND HIGH THROUGHPUT PROCESSING

Novel deposition processes

Plasma-enhanced chemically vapour deposited Si_3N_4 thin films for optical waveguides 311
J. M. Gonzálvez, R. G. Luna, M. Tudanca, O. Sánchez, J. M. Albella and J. M. Martínez-Duart (Madrid, Spain)

Optical thin films

Improved Langmuir probe surface coatings for the Cassini satellite 315
M. K. Wahlström, E. Johansson, E. Veszelei, P. Bennich, M. Olsson and S. Hogmark (Uppsala, Sweden)

Transparent conductive coatings

Electrical, optical and chemical properties of indium–tin oxidized films grown by sequential electron beam deposition of indium and tin 321
A. K. Kulkarni and S. A. Knickerbocker (Houghton, MI, USA)

Highly conductive and transparent ZnO:Al thin films prepared on high-temperature substrates by d.c. magnetron sputtering 327
H. Sato, T. Minami, S. Takata (Ishikawa, Japan), T. Mouri and N. Ogawa (Yamaguchi, Japan)

Optical films and high throughput processing (Poster session)

Influence of manufacturing process of indium tin oxide sputtering targets on sputtering behavior 333
B. L. Gehman (Morgan Hill, CA, USA), S. Jonsson, T. Rudolph (Hanau, Germany), M. Scherer (Alzenau, Germany), M. Weigert (Hanau, Germany) and R. Werner (Alzenau, Germany)

Author Index 337

Subject Index 339